Простейшие показательные ур-я

$a^{f(x)} = a^{g(x)}$, $a \neq 0$, $a \neq 1$

$f(x) = g(x)$

6.1. $13^{x-2} = 13^{3+2x}$ => $x-2 = 3+2x$ => $x-2x = 3+2$ => $-x = 5$ => $x = -5$

6.2. [демо-2024] $3^{x-5} = 81$ => $3^{x-5} = 3^4$ => $x-5=4$ => $x = 9$

6.3. [ЕГЭ-2021] $5^{x-7} = \frac{1}{125}$ => $5^{x-7} = \frac{1}{5^3}$ => $5^{x-7} = 5^{-3}$ => $x-7=-3$ => $x = 4$

6.4. [ЕГЭ-2021] $\left(\frac{1}{3}\right)^{x-8} = \frac{1}{9}$ => $\left(\frac{1}{3}\right)^{x-8} = \left(\frac{1}{3}\right)^2$ => $x-8=2$ => $x = 10$

6.5. [ЕГЭ-2021] $\left(\frac{1}{2}\right)^{6-2x} = 4$ => $(2^{-1})^{6-2x} = 2^2$ => $2^{-6+2x} = 2^2$ =>

$-6+2x=2$ => $2x = 8$ => $x = 4$

6.6.* $4^x + 4^{x+2} = 272$

$4^x + 4^x \cdot 4^2 = 272$

$4^x(1+16) = 272$

$17 \cdot 4^x = 272 \quad |:17$

$4^x = 16$

$4^x = 4^2$

$x = 2$

6.7.* $16 \cdot 5^{3-x} = 625 \cdot 2^{3-x}$

$a^n \cdot b^n = (ab)^n$ $\qquad \frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$

Делим 2^{3-x}

$16 \cdot \frac{5^{3-x}}{2^{3-x}} = 625 \quad |:16$

$\left(\frac{5}{2}\right)^{3-x} = \frac{625}{16} = \frac{5^4}{2^4} = \left(\frac{5}{2}\right)^4$

$3-x = 4$

$-x = 1$

$x = -1$

6.8.* $0{,}2^{2x-0{,}5} = 25\sqrt{5}$

$0{,}2 = \frac{1}{5} = 5^{-1}$

$25 = 5^2$

$\sqrt{5} = 5^{\frac{1}{2}}$

$25\sqrt{5} = 5^2 \cdot 5^{\frac{1}{2}} = 5^{2{,}5}$

$(5^{-1})^{2x-0{,}5} = 5^{2{,}5}$

$5^{-2x+0{,}5} = 5^{2{,}5}$

$-2x+0{,}5 = 2{,}5$

$-2x = 2$

$x = -1$

6.9.* $17 \cdot 4^x - 19 \cdot 2^x + 2 = 0$ $\qquad a^x > 0$!!!

$4^x = (2^2)^x = 2^{2x} = (2^x)^2$

Замена: $t = 2^x$; $4^x = t^2$ $(t>0)$

$17t^2 - 19t + 2 = 0$

$D = 19^2 - 4 \cdot 17 \cdot 2 = 400 - 40 + 1 - 8 \cdot 17 = 360 + 1 - 80 - 56 =$

$= 280 - 55 = 225 = 15^2$

$t_{1,2} = \frac{19 \pm 15}{34}$ $\qquad t_1 = \frac{19-15}{34} = \frac{4}{34} = \frac{2}{17}$

$t_2 = \frac{19+15}{34} = 1$

Наибольш. $t = 1$

$2^x = 1$ => $2^x = 2^0$ => $x = 0$